GREENFIELD POLLINATOR ACTION PLAN



Identifying and Expanding Wild Pollinator Habitat in the City of Greenfield

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The *Greenfield Pollinator Action Plan* was developed through close collaboration with municipal staff and committee members from the Greenfield Planning Department, Zoning Board of Appeals, Conservation Commission, Greenfield Tree Committee, ¹ and the Conservation Agent. The planning process also involved participation from community-based organizations, including Greening Greenfield, ² Just Roots, ³ Pollinators Welcome, ⁴ as well as others working to improve pollinator habitat at the John Zon Community Center, the YMCA, public schools, and elsewhere around Greenfield. Engagement of the community, education and outreach, and partnerships between local groups and the City will continue to be important strategies for advancing the objectives of this plan and continuing the beneficial work for native pollinators.

The *Greenfield Pollinator Action Plan* is part of the *Regional Pollinator Action Plan* for Franklin County, which also included the towns of Heath, Shelburne, Conway, Montague, Bernardston, Wendell, and Orange. The purpose of the Pollinator Plans is to identify strategies to develop pollinator habitat at a municipal and landscape scale through community engagement. To view the *Regional Pollinator Action Plan*, the *Regional Pollinator Habitat Corridor Implementation Toolkit*, and the *Pollinator Action Plans* for each of the other participating towns, go to https://frcog.org/franklin-county-regional-pollinator-plan/.

¹ www.greenfieldtreecommittee.org

² https://greeninggreenfieldma.org/about-us

³ https://justroots.org/about/

⁴ https://pollinatorswelcome.com/

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LANDSCAPE ANALYSIS

Natural resource inventory and parcel maps of the City of Greenfield were developed with MassGIS and other available geospatial data to identify existing land cover and land use, priority habitat, water resources, development patterns and areas of habitat fragmentation, protected open space and municipal properties, paved and gravel roads in town, and other relevant resources and constraints. The method of landscape-scale analysis followed these steps:

- Identify pollinator habitat by analyzing land cover and land use, protected open space, rivers and wetlands, Natural Heritage and Endangered Species (NHESP) BioMap2 Core Habitat, utility corridors and right-of-ways (ROWs).
- Consider special geologic, hydrologic, soil, vegetation, and microclimate assets in Greenfield that serve as valuable resource areas for the whole lifecycle of pollinators across multiple seasons, including nesting, larval, and adult stages.
- o Include locally observed habitat and known habitat resource areas.
- Identify existing conditions, habitat, and development patterns, and areas of habitat fragmentation.
- Use GIS and local knowledge to create the maps.

Landscape Analysis for the City of Greenfield included the following maps, which can be found at the end of the plan:

- Habitat and Environmental Resources
- Land Cover and Land Use
- Permanently Protected and Municipal Properties

Landscape analysis shows Greenfield's many variable landscapes. The southeastern quarter of the City contains the downtown area bounded by Interstate 91 to the west, Route 2 to the north, and Rocky Mountain Park to the east. Many City-owned parks, cemeteries, schools, and residential gardens, and street trees are dispersed throughout the downtown area, along the Route 5&10 (Federal Street) commercial corridor. On the north side of Route 2 is Stoneleigh-Burnham School, an industrial park, the Griswold Conservation Area, and the Route 5&10 corridor. This area is surrounded by rural and suburban neighborhood developments amidst a mostly forested landscape. There is a major utility corridor traversing the northern portion of Greenfield that also travels through Gill, Erving, Montague, Shelburne, Colrain and Heath.

The western half of Greenfield is primarily agricultural, residential and forested landscapes. Cultivated agricultural lands, pastures and hayfields predominate along the Green River and its larger tributaries that flow in from the western boundary line. The Green River winds from the

northwest to southeast across the City. It passes under I-91 and past several historic industrial areas on River, Mill, and Deerfield Streets before converging with the Deerfield River at the southern boundary line. The Green River and Rocky Mountain Park are each continuous north-south natural features on either side of downtown Greenfield, with the Green River to the west and Rocky Mountain Park to the east. Both are identified as BioMap 2 Core Habitat—state-designated high-quality habitat and intact ecosystem areas, as well as NHESP Priority Habitat - the known geographical extent of habitat for all state-listed rare species, both plants and animals, which is regulated under the Massachusetts Endangered Species Act (MESA).

Maps of existing and potential sites for pollinator habitat areas and corridors were developed through both GIS landscape analysis and community input collected during three pollinator planning workshops with the City of Greenfield on October 28, 2020, November 18, 2020 and January 21, 2021. In these workshops, FRCOG facilitated meetings with Greenfield pollinator stakeholders via Zoom to review draft GIS maps of the City, to discuss existing and potential locations of pollinator habitat, and to inventory locally known existing pollinator habitats as well as potential locations for creating new pollinator habitat.

Knowledge and input from the Greenfield Pollinator Planning Workshops were used to create the following maps, which can be found at the end of the plan:

- Existing & Potential Sites of Pollinator Habitat
 - North Greenfield Existing & Potential Pollinator Sites
 - South Greenfield Existing & Potential Pollinator Sites
 - Greenfield City Center Existing & Potential Pollinator Sites
- Pollinator Corridors & Habitat Stepping Stones
- City of Greenfield DPW Roadside Mowing

EXISTING HABITATS & RESOURCE AREAS

According to the Natural Resources Conservation Service (NRCS), the best pollinator habitat will generally have access to food, cover, and water in close proximity as well as connectivity to other important habitats, such as deciduous forests. Sunny and open conditions, field edges, and hedgerows are needed for ground nesting sites, as well as wood and pithy-stem nesting pollinators.⁵

A number of existing pollinator habitats and resource areas in Greenfield can be inferred based on the prime pollinator land cover types data displayed in the *Pollinator Corridors & Habitat Stepping Stones* map. In this map, prime pollinator land cover consists of Sunny Open Landscapes, and Forested and Open Wetlands, which are two groups of Land Cover data that were extracted from MassGIS 2016 Land Cover/Land Use. ⁶

The two groups of prime pollinator land cover consists of the specific MassGIS 2016 land cover types listed in the following table. These land cover types meet the characteristics described by the NRCS as beneficial for pollinators, and therefore provides the basis for inferring the presence of the pollinator corridors and stepping stones. This method was used to create the *Pollinator Corridors & Habitat Stepping Stones* maps for Franklin County and for each town participating in the Regional Pollinator Plan.

Prime Pollinator Land Cover Types7

Sunny Open Landscapes

Cultivated
Pasture/hay
Developed open space
Grassland
Scrub/shrub

Forested and Open Wetlands

Forested wetland Non-forested wetland

In addition to pollinator habitat that is identified through GIS landscape analysis, local knowledge contributed by workshop participants identified additional existing wildflower locations, farms, pollinator-friendly gardens, municipal areas, and connected corridors that are important for wild native pollinators in Greenfield. These locations are indicated as "existing pollinator sites" on the *Existing and Potential Sites of Pollinator Habitat* map.

Riparian Areas

Rivers, streams, lakes and ponds are important pollinator habitat because they are partially open to the sun or very sunny, host a great diversity of flowering woody and herbaceous plant

https://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcseprd1431219&ext=pdf

⁶ https://docs.digital.mass.gov/dataset/massgis-data-2016-land-coverland-use

⁷ extracted from 2016 Land Cover/Land Use data by Future Lands Design in collaboration with the FRCOG Planning Department

species, and typically have an abundance of forage and water resources that are essential to wild native pollinators. The sandy and clay substrates that can make up beds, banks, and floodplains can provide nesting habitat for ground-nesting bees. Rivers and streams can be vital pollinator corridors because they are naturally continuous. Waterbodies act as good habitat core areas as well as stepping stones. The following waterbodies are important for pollinator habitat in Greenfield:

- Green River
- o Deerfield River
- Connecticut River
- o Fall River
- Isolated wetlands and wetland networks

Farms

Large parcels with cultivated land cover, including farms producing commercial crops, dairy, hay and orchards, can be a major resource for pollinators depending on farmland management practices. Farmland in northwest Greenfield is a broad mosaic of cultivated land in the Green River watershed. Streams, deciduous forests, and suburban-rural residential development border wide swaths of open, sunny fields – the ideal combination of landscapes for pollinators. Just Roots Farm is located in this part of Greenfield and grows food with a mission of increasing access to healthy, local food by connecting people, land, and resources. Participants in Greenfield's pollinator planning workshops recognized that, in addition to providing local, organic food through a community food-justice structure, Just Roots is also adapting its farming practices to improve the benefit to pollinators. Jessica O'Neill, Just Roots' Executive Director, attended several of Greenfield's Pollinator Planning workshops and indicated that additional areas are being planned at the farm that will be dedicated to pollinator habitat.

If other farms in Greenfield adopted pollinator-friendly practices or dedicated areas of farmland or agricultural hedgerows to pollinator habitat, the broad mosaic of Greenfield's farmland would become enriched with pollinator resources in even greater abundance.

Existing Pollinator Corridors

Greenfield's major pollinator corridors observable on the Landscape Analysis maps include:

- The Green River Corridor and associated riparian habitat
- o Green River watershed basin and adjacent farmland in northwest Greenfield
- Rocky Mountain Park/Temple Woods and the Connecticut River
- The major utility corridor through north Greenfield (depending on management practices)
- o Continuous plantings of native street trees along City streets including but not limited to:
 - Main Street
 - Kenwood Street

⁸ https://justroots.org/organization/

- Norwood Street
- DPW Mown Roadsides (depending on mowing practices)
 - · Green River Road
 - Leyden Road
 - Colrain Road
 - Country Club Road
 - Adams Road
 - South Shelburne Road
 - · Petty Plain Road
 - Wisdom Way

Neighborhood Networks

Greenfield city center and neighborhoods surrounding the downtown area are home to many ecologically aware homesteaders and residential gardeners. Many residents share an interest in creating native pollinator habitat on the land that they care for, whether small and managed, or big and wild. Greening Greenfield encourages residents to create native pollinator habitat in their yards, and/or volunteer in one of the many private properties in the City where residents are actively cultivating pollinator gardens. Greening Greenfield manages a list of volunteer opportunities on public land. ⁹

The Greenfield Tree Committee has also been active in expanding efforts to revegetate the City with new native plantings, especially in the downtown neighborhoods. The Greenfield Tree Committee manages a GIS inventory of public street trees, which includes a comprehensive data set documenting each plant's spatial coordinates, whether the plant is native or non-native, its condition, and many other important metrics. The Tree Committee works with other City departments, including the Department of Public Works, to plant more native trees and shrubs in street ROWs and manages a community engagement campaign that brings residents into the tree-planting process each year. Not only can Greenfield residents request tree plantings in empty spaces on their street, they can also participate in the care and maintenance of newly planted street trees.

Public Parcels

Several public parcels were identified by workshop participants as existing sites of pollinator habitat in Greenfield. These include:

- Just Roots Farm
- o The Permaculture Garden at Franklin County Jail
- The Outdoor Learning Laboratory at Greenfield Community College
- o Four Rivers School

Note: this site is being updated. The name of the list may change.

⁹ https://sites.google.com/view/greenfieldgardens/home.

- Rocky Mountain Park and Temple Woods
- John Zon Community Center Gardens
- Chapman Davis Parking Lot rain gardens¹⁰
- o The Energy Park
- o Plantings at Fiske Ave
- Greenfield Public schools
- YMCA

Other Important Areas

A variety of other areas in Greenfield stand out as having potential value for wild, native pollinators because they include buffers bordering roads, rivers and streams, as well as locations characterized by contiguous, open, sunny landscapes surrounded by deciduous forests and developed open space. However, any potential pollinator value is contingent upon pollinator-friendly landscape management practices being applied.

The following sites in Greenfield could have potential pollinator value, and current management practices do not include the use of herbicides. However, native pollinator plants are few, landscapes are dominated by turf, and the mowing regimen is not always pollinator-friendly:

- o Roadside edges
- o Parks
- Cemeteries

The following sites in Greenfield could have potential pollinator value, however landscapes are dominated by turf, mowing regimens are not always pollinator-friendly, and current management practices include the regular use of herbicides:

- Country Club of Greenfield
- The Meadows Golf Course
- The Industrial Park

Landscape management practices at all of these areas could be modified to support native flowering plant species and longer bloom periods, limited-to-no use of herbicides or pesticides, and invasive plant management, which would allow these areas to become increasingly valuable as pollinator habitat. For example, a pollinator garden was recently planted at BETE Fog Nozzle, Inc., which is a manufacturer located at the industrial park in Greenfield. This company effort demonstrates that beneficial landscape management practices can take root in what might seem like an unlikely setting.

¹⁰ One Greenfield pollinator workshop participant noted that the pollinator habitat value of these raingardens has likely diminished due to lack of maintenance, and are no longer comprised of pollinator plant species.

EXPANDING POLLINATOR HABITAT

The Pollinator Corridors & Habitat Stepping Stones map shows a series of well-connected pollinator corridors as well as isolated stepping stones of connectivity between pollinator corridors in Greenfield. The quality and connectivity of existing pollinator habitat may be enhanced at the sites labeled "Potential Sites" on Greenfield's Existing & Potential Sites of Pollinator Habitat map, which represents an inventory of locations that workshop participants identified for creating new pollinator habitat. The areas indicated as "stepping stones" on Greenfield's Pollinator Corridors & Habitat Stepping Stones map also represent key locations for expanding pollinator habitat. This strategy is beneficial by expanding the size, quality, and the physical proximity of pollinator habitat areas to one another, which helps more pollinators meet the requirements of their life cycle needs.

Pollinator habitat can be expanded through more generally beneficial strategies and approaches too. For example, Greenfield residents and stewards of large parcels of cultivated land can adopt pollinator-friendly land management practices and actively work to enhance local ecosystems with native plants, creating habitat and additional corridors or stepping stones. Whatever the strategy, expanding existing and implementing new pollinator habitat in Greenfield will be accomplished by pollinator stakeholders working together to pursue opportunities and building upon the many assets and strengths of Greenfield and the greater region.

Greenfield's Prime Opportunity Areas

Greenfield's prime opportunity areas for expanding pollinator habitat are on public parcels, roadsides, private gardens and homesteads, and local farms. Landscape change in these locations would need to be supported by the City Department of Public Works and Planning Department, other municipal boards and committees, informed residents and dedicated volunteers, and land stewards managing large parcels of forestland, meadows, pastures, and open space. Details on each opportunity area are outlined below, and the *Summary of Implementation Opportunities and Strategies in Greenfield* table at the end of this section lists ideas brainstormed during the Greenfield pollinator planning workshops.

Pollinator Opportunity Areas on Public Parcels

Many public parcels were recognized as potential opportunity areas for creating or expanding pollinator habitat in Greenfield, as were some private properties, which play a major role in the community. These include:

- Millers Meadow (Wedgewood Gardens)
- City Common, City Hall rain gardens
- Veteran's Mall
- Greenfield Public Library

- JWO Transit Center & Olive Street rain gardens
- Energy Park
- Pocket Park at the Parking Garage
- Pocket Park in front of Mesa Verde

- Greenfield YMCA gardens
- o Greenfield Middle School & High School
- Stoneleigh Burnham
- Franklin County Fairgrounds
- Wastewater Treatment Plant
- o The Greenfield Center School
- o Green River Bike Path
- o Green River swimming area
- Murphy Park
- Shattuck Street Public Park

- A municipal lot overlooking the Railroad ROW
- Greenfield Savings Bank
- Baystate Franklin Medical
- Elder Care facilities
- Elm Courts & Oak Courts
- Greenfield Gardens
- Levden Woods
- o Temple Woods
- o The Meadows Golf Course
- Country Club of Greenfield

Greenfield has many of the key ingredients needed to enrich public landscapes with pollinator habitat. In particular, it has support from municipal leadership, enthusiastic community support, some volunteer support, and an ideal mix of prime pollinator land cover types in its developed and open landscapes. Any potential expansion of pollinator habitat certainly will involve skillful care and maintenance and most likely, upfront implementation costs. City departments and staff should be involved from the beginning of any project to ensure their leadership and oversight. However, given existing staff capacity in the context of a growing number of pollinator opportunities as well as interest from the community to implement them, the City may need to consider additional staffing and training necessary for this project to succeed long-term.

Residential Gardens and Homesteads

Some members of the Greenfield community are already very interested and engaged in creating and stewarding local, native pollinator habitat. Continuing to build upon the momentum and the collective capacity among residents to carry out this work is an important long-term strategy. Some residents are equipped with information that supports maintenance of native pollinator habitat, however many more residents practice conventional lawn and garden care, comprised of regular mowing, application of pesticides and herbicides, and planting of non-native plant species.

Residential parcels of any size acreage should be encouraged to support this mission of ecosystem restoration and pollinator resilience. This idea is especially relevant in the context of downtown neighborhoods where residential lots are small. One very important neighborhoodscale need identified by workshop participants in pollinator planning workshops with other towns is to organize bulk purchases of native plants and wildflower seed from reputable local nurseries (see the Regional Pollinator Plan for native-plant nurseries that facilitate bulk purchasing).

Farmland and Large Cultivated Parcels

Many agricultural operations in Greenfield may not already be thinking about pollinator habitat and could be encouraged to do so; among them, vegetable farms and hayfields, dairy farms, orchards, and livestock farms. Monocropping, poorly timed mowing, and pesticide application are three common agricultural practices that can tend to have deleterious effects on pollinators. Planting a diversity of plants with staggered flowering times, even if only in strips planted expressly for pollinators, can mitigate the impact of the monocrops, which have a limited timespan for providing food and do not support the complete lifecycle of many pollinators. ¹¹ Mowing areas after the availability of nectar and pollen resources has been exhausted better supports pollinators. Conventional pesticides are almost universally harmful to pollinators, as are some organic options. Tailoring spraying practices to protect pollinators is one option for adapting to pollinators. However, reducing or eliminating pesticide application is the preferred option.

Farmland can be supplemented with pollinator habitat along woodland edges, in hedgerows, pollinator planting strips, buffer strips (including roadside buffer strips), and around resource areas such as ponds, wetlands, and streams. Pollinator habitat can also be suited to the more sloped sections of farm fields. However, successfully establishing habitat for wild native pollinators involves planting new native plants and managing invasive species that can overtake and undermine new plantings. The task of managing invasive species would be a major undertaking in Greenfield, as it is for many other towns in Massachusetts.

Some farmers may have limited experience with cultivating native pollinator plant species. In addition to gaining a strong understanding of why pollinator habitat is valuable on farms, farmers need to know when, where, what, and how to plant pollinator habitat on their land. Resources for farmers on how to propagate, establish, and maintain native plantings are essential to this kind of transition. The Xerces Society provides guidance on milkweed species for the Northeast and strategies for propagation.¹² The United States Department of Agriculture (USDA) also provides some resources on pollinator value in conservation plantings.¹³ See the Resources section of the *Regional Pollinator Action Plan*. It is likely that more research is needed in this area.

Given the small profit margin farm businesses work within, farmers may also need compensation for extra work to enhance pollinator habitat. Many of the grants and reimbursements available to farmers for environmental stewardship, especially through the USDA NRCS, have provisions for funding pollinator improvements, but farmers in Greenfield

¹¹ https://www.canr.msu.edu/news/national-study-documents-u-s-specialty-crop-farmers-can-increase-yields-through-improved-pollination

^{12 &}quot;Project Milkweed": https://xerces.org/milkweed

[&]quot;Milkweeds of the Northeast": https://xerces.org/sites/default/files/publications/19-029.pdf

¹³ "Pollinator Habitat":

https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/plantsanimals/pollinate/?cid=stelprdb1044847

need resources to apply for those grants, including a schedule of grant cycles and guidelines for design, plant selection, and management. The NRCS provides incentives for pollinators in many of their grants, including the Conservation Stewardship Program. A table of potential agricultural grants and funding sources for farmers to implement pollinator habitat on farmland can be found in the discussion of funding sources in the *Regional Pollinator Action Plan*.

There may be an emerging market for local ecotype native plant seed propagation that local farms could leverage. A participant of the Montague pollinator planning workshop with experience installing pollinator gardens reported that they commonly have to source seeds from out of the state. Propagating native pollinator plants could have the double benefit of providing abundant pollinator habitat and economic benefit through the sale of seeds.

Other Opportunity Areas

Utility and Highway Corridors

The City is traversed by a major east-west power utility corridor north of the downtown area. Most woody vegetation under the power lines is eliminated by the utilities companies via 'cut and paint' herbicide applications. When native trees and shrubs do grow along the peripheral forested edges within utility right-of-ways (ROWs), they can contribute to a continuity of pollinator forage and nesting habitat. Where utility corridors cross open wetlands, the pollinator habitat value is even greater. Once again, however, the concern regarding utility ROWs as pollinator corridors is that they are typically maintained by utility companies with management practices that are detrimental to pollinators. Particularly problematic for pollinators is the broad application of herbicides, which indiscriminately kills native vegetation providing pollinator habitat. Alternatives to broad-spraying include vegetation management practices that allow for both effective maintenance of the ROW and minimal ecological harm. This could include mechanical removal or cutting of vegetation with 'cut and paint' herbicide application. Practices that are specifically pollinator-friendly, or proactively improve pollinator habitat value in the ROWs could be further developed and implemented.

The Conservation Commission may have opportunities to review updates of future Vegetation Management Plans of utility companies managing infrastructure work and projects happening nearby, which could give the City an opportunity to request specific plan improvements that reflect more pollinator-friendly practices. The City could prepare a list of key locations on power line utility corridors and recommend landscape management strategies that protect and enhance the pollinator resources that exist there. However, working with utility companies can be challenging, and altering their practices would require a significant long-term commitment to advocating for substantial changes.

A similar approach could focus on highway corridors for pollinator-friendly, low-mow opportunity areas on the Interstate 91 highway median and ROW edges. There is a no-mow

patch of meadow being developed on the rotary of Route 2 and Interstate 91, which may offer lessons learned and serve as model for similar patches of meadow that could provide stepping stones of pollinator habitat connectivity along the highway. A key metric for making the case for pollinator habitat on highway ROWs would be whether there are cost-savings for maintenance of these areas, which would be an additional benefit to the known ecological benefits of meadows.

Golf Courses

The Meadows Golf Course offers an expanse of open space at the confluence of the Green River and the Deerfield River that could support pollinator habitat, enhance the riparian habitat value on both rivers, and reinforce the pollinator corridors that are associated with them. Fairways are often heavily mowed and sprayed, but golf courses contain large areas that remain out-of-play and could be seeded for pollinator forage or managed for bee nesting. The same potential may apply to the Country Club of Greenfield. A number of resources on pollinator-friendly practices for golf courses are available.¹⁴

Riparian Areas

The multifold benefits of the land around rivers, streams, lakes, and ponds include sun, water, forage, and nesting habitat. While there are already many riparian corridors that function well as bee habitat, others are compromised by the presence of invasive plant species, especially Japanese knotweed. Support for ongoing invasive plant species prevention and eradication projects will likely benefit wild native pollinators.

Recreational Trails

Pollinator corridors and stepping stones of habitat connectivity are essential for pollinators to travel safely and to access food and nesting resources. Recreational trails can contribute to habitat connectivity because they tend to be continuous paths with "edge" conditions through natural landscapes. Greenfield has a wealth of hiking trails in a variety of wild areas, from trails through the wooded Griswold/GTD Conservation Area, to riverine corridors like those along the Green River Bike Path, to the trails through the Highland and Rocky Mountain Parks and Temple Woods. Hiking and recreational trails offer the potential for stepping stones of connectivity between larger pollinator corridors across the City and can help pollinators fulfill their life cycle needs in the relative safety and ecological suitability of trail edges. These stepping stones can

¹⁴ Xerces Society, "Making Room for Native Pollinators: How to Create Habitat for Pollinator Insects on Golf Courses": https://xerces.org/sites/default/files/2018-05/06-001_02_XercesSoc_Making-Room-for-Native-Pollinators.pdf

USGA, "Course Care: Practical Pollinator Programs": https://www.usga.org/course-care/regional-updates/northeast-region/practical-pollinator-programs.html

be reinforced by creating patches along recreation trails that provide forage with pollinator plants as well as bee nesting sites that are connected, yet safely located off of the trail path.

Paved and Gravel Roads

Like recreational trails, gravel roads in the more rural parts of Greenfield can also be especially good pollinator habitat because of the 'edge' conditions that they create in which wild pollinators can find food, nesting, and meet other life cycle needs along continuous pathways that offer connectivity between larger pollinator corridors. The gravel substrate of the rural dirt roads is itself an attractive medium for ground-nesting bees. The risk, of course, is vehicular traffic as well as roadside maintenance practices.

The Greenfield Department of Public Works (DPW) is in charge of much of the landscape maintenance on transportation right-of-ways. With input from the DPW, FRCOG developed a map showing some of the roads and streets where Greenfield DPW does roadside mowing. Modifying mowing practices or managing existing roadside edges to serve as corridors for pollinator movement could create effective and important habitat connections for native pollinators. Updated mowing practices can include raising the mower heights to four inches, delaying mowing into late spring, and reducing mowing frequency during the growing season. For managed meadow locations, mowing once a year with the area divided into 2-4 sections, with sections mowed on alternate years.

The DPW may need guidance and training for adopting pollinator-friendly roadside mowing practices. The *Handbook for Supporting Pollinators through Roadside Maintenance and Landscape Design* prepared by the U.S. Department of Transportation Federal Highway Administration could be used as a starting point for Highway Departments interested in adjusting their mowing practices. ¹⁵ Management practices presented in the handbook emphasize win-win strategies that maintain public safety standards *and* save time, trouble and costs with fewer and simpler mowing regimens and other ecological practices.

Solar Installations

Ground-mounted solar is often sited on open land and habitats that benefit native wildlife. Solar facility locations are advantageous places to manage for pollinator habitat because they equate to very large areas of contiguous sunny, open space where flexible mowing needs can accommodate pollinator life-cycles. Refer to discussions of large scale solar arrays in the *Regional Pollinator Action Plan* for more information on the value and management of ground-

¹⁵ U.S. Department of Transportation Federal Highway Administration, "Handbook for Supporting Pollinators through Roadside Maintenance and Landscape":

 $https://www.environment.fhwa.dot.gov/env_topics/ecosystems/Pollinators_Roadsides/BMPs_pollinators_landscapes.pdf$

mounted solar for pollinator habitat and this plan for recommended City Ordinance language for solar installations that reinforces pollinator habitat.

Outreach, Education & Volunteering

Increasing pollinator resources in the community will involve a variety of participants, including municipal staff, residents, and local businesses and organizations. As discussed in the *Regional Pollinator Action Plan* and in this plan, even though pollinator habitat areas can be resilient and low-maintenance landscapes, creating and managing them over the long-term requires labor, time and money. Community engagement and volunteer support can play a key role in realizing the potential for pollinator projects on City-owned parcels. Greenfield's Department of Planning, Department of Public Works (DPW), the Parks & Recreation Department, Conservation Commission, Conservation Agent, the Greenfield Tree Committee, Just Roots Farm, and Greening Greenfield all have great ideas and vision for incorporating pollinator resources within the City's jurisdiction. Combined with consistent, volunteered labor contributed by the community, the City may be able to initiate its top priority pollinator-friendly initiatives.

The City's website can serve as a community information resource that provides lists of pollinator education materials for residents looking for guidance on how to create and expand pollinator habitat in their own yards and properties, how to support efforts undertaken by the City, and how to connect with groups in Greenfield and across the county working to implement the *Greenfield Pollinator Action Plan* and the *Regional Pollinator Plan*.

The Summary of Implementation Opportunities and Strategies in Greenfield table lists ideas brainstormed during the Greenfield pollinator planning workshop for expanding pollinator habitat in the City.

Summary of Implementation Opportunities and Strategies in Greenfield				
Opportunity/Location	Strategy	Jurisdiction	Potential Partners	
Residential gardens, homesteads, properties City-wide	Gather information and resources including pollinator plant lists and mowing regimen changes for protecting seed heads and overwintering insects on private property. Share with City boards and committees, neighborhood networks, schools, the senior center, and church groups to help with community outreach.	Private	Residents, City boards and committees, neighborhood networks, schools, the senior center, and church groups Greening Greenfield	
Residential gardens, homesteads, and properties City-wide	Coordinate neighborhood groups to organize bulk purchases of native pollinator plants or seed from reputable nurseries.	Private	Residents and landowners, Greening Greenfield	
Properties City-wide	Utilize local knowledge and neighborhood networks to provide site assessments to help identify pollinator opportunities, priorities and challenges on properties City-wide.	Private	Residents, landowners	
Privately and publicly owned public spaces	Install and maintain pollinator habitat into key public spaces throughout the City. Procure and install educational signage about native pollinator habitat. include short- and long-term maintenance plans for new habitat areas and identify parties responsible for maintenance.	Private/City	Residents, businesses, Parks & Recreation Department, Greening Greenfield	
Urban streets	Continue to increase tree canopy by planting native trees in tree belts, in private front yards, and urging residents to plant native trees, especially native shade trees on their property	Private/City	Department of Public Works, Greenfield Tree Committee, Greening Greenfield	
Privately and publicly owned public spaces	Invasive plants: Create a goal and plan to remove invasive plants, and replant with native pollinator plants.	City	City Council, residents, Parks & Recreation	
Farmland and Large Cultivated Parcels	Gather information and resources including plant lists, mowing regimen changes, grant funding, plant starts and seed sources for farmland and large cultivated parcels. Reach out to farmers and landowners to implement pollinator habitat on their farm fields, hayfields, and field edges, and to learn and apply invasive species management strategies on their land.	Private	Residents, farmers, landowners, Agricultural Commission, Conservation Commission, Conservation Agent, UMass Energy Extension Service, Just Roots	
Properties City-wide	Provide plant identification resources for recognizing young pollinator plants, and plants at different life stages, and encourage their protection from mowing. Develop and share a master document with plant ID information and photos.	Private/Public	Western Massachusetts Master Gardener Association, Greening Greenfield, and many other City- wide volunteers	
Greenfield City Properties	Assess potential for pollinator-friendly mowing practices in non- recreational areas, including cemeteries and around municipal buildings. Mitigate and manage invasive species.	City	City Planner, Department of Public Works, Parks & Recreation Department	

Summary of Implementation Opportunities and Strategies in Greenfield					
Opportunity/Location	Strategy	Jurisdiction	Potential Partners		
Greenfield City Properties	Include a high proportion of pollinator plant species in any park	City	Tree Committee, Parks &		
	redevelopment projects.		Recreation Department		
Municipal Roads	Work with the DPW to develop pollinator-friendly mowing practices.	City	Residents, Greening Greenfield,		
	Work to build support for recommended changes from DPW and other		Department of Public Works		
	City Planning Departments. Request that the practices become policy,		(DPW)		
	and create a timeline to begin implementation on City properties and				
	potential roadsides.				
Large ground-mounted	Support the Planning Board in adopting recommendations for	City	Planning Board		
solar arrays and new	Potential Changes to the City's Zoning Bylaws and Subdivision				
development City-wide	Regulations.				
Wetlands	Update and revise Chapter 423, the City's Wetland Protection	City	Conservation Commission		
	Ordinance, with language that advocates for the care and the planting				
	of recommended beneficial plants in jurisdictional areas.				
Open water, wetlands, and	Coordinate riparian corridor stewardship by landowners, including	Private/City	Residents, Greening Greenfield,		
river corridors	management strategies for Japanese knotweed. Incorporate pollinator		City Planner, Department of Public		
	habitat into all types of projects along the Green River, Deerfield River,		Works, Conservation Commission		
	Connecticut River and their tributaries.				
Millers Meadow AKA	Support the City in taking steps towards mitigating invasive plants and	City	Planning Department, Parks and		
Wedgewood Gardens	creating pollinator habitat on the Millers Meadow site. Use the		Recreation Department,		
	pollinator concept design at the end of this document and FRCOG's		Greenfield Tree Committee		
	Pollinator Toolkit to guide site and planting design and				
	implementation.				

Recommended Revisions to Greenfield's City Zoning Ordinance and Subdivision Regulations

One way to create and protect pollinators is by updating land use regulations to address pollinator habitat. For this project, the FRCOG reviewed Greenfield's land use regulations and identified potential changes to the Zoning Ordinance and Subdivision Regulations. Greenfield's Planning Board can review potential changes and decide whether to pursue the proposed amendments. The key areas where changes can be incorporated are:

- Site Plan Review,
- Special Permits,
- Large-Scale Solar Facilities,
- Open Space Residential Development/ Conservation Development/ Major Residential Development, and
- Subdivision Regulations.

Site Plan Review

- 1. **Content of Site Plan** Add existing or proposed locations of pollinator habitat to the required contents of the Site Plan. Pollinator habitat consisting of native wildflower and tree species can be an alternative to grass or other proposed landscaping.
- 2. **Review Criteria** Add creation and/or conservation of pollinator habitat as a criteria.
- 3. **Landscape Maintenance** Add requirement for annual monitoring and maintenance of the pollinator habitat to the Site Plan Review conditions.

Special Permits

- 1. **Content of Application** Add existing or proposed locations of pollinator habitat to suggested contents of the Special Permit Application.
- 2. **Special Permit Criteria** Add creation and/or conservation of pollinator habitat as a criteria.
- 3. **Landscape Maintenance** Add requirement for annual monitoring and maintenance of the pollinator habitat to the Special Permit conditions.

Large Scale Solar Facilities

- 1. **Content of Application** Add a paragraph requiring that a native flowering planting plan that supports pollinators be planted under the solar array instead of grass or semi pervious or impervious materials.
- 2. Review Criteria Add creation and/or conservation of pollinator habitat as criteria.

3. **Landscape Maintenance** – Add requirement for annual monitoring and maintenance of the pollinator habitat to the Special Permit conditions.

Open Space Residential Design (OSRD)/ Conservation Development/ Major Residential Design

- 1. **Content of Application** Add existing or proposed locations of pollinator habitat to suggested contents of the development plan.
- 2. Review Criteria Add creation and/or conservation of pollinator habitat as criteria.
- 3. **Landscaping** Require or encourage the planting of pollinator habitat as an alternative to grass or traditional landscaped areas in the development plan and make provisions for the maintenance of these areas.
- 4. **Maintenance** Add requirement for annual monitoring and maintenance of the pollinator habitat to the Special Permit conditions.

Subdivision Regulations

- 1. **Purpose** Add to the purpose statement the provision of wildlife and pollinator habitat.
- 2. **Content of Definitive Plan** Add existing or proposed locations of pollinator habitat to the required contents of the Definitive Plan.
- 3. **Environmental Analysis** Add to the Environmental Analysis the impact of the subdivision on native plants and pollinator habitat.
- 4. **Tree Belts, Grass Plots or Landscaped Areas** Encourage the planting of pollinator habitat as an alternative to grass or traditional landscaped areas in the subdivision plan and make provisions for the maintenance of these areas.
- 5. **Special Permit Criteria** Add creation and/or conservation of pollinator habitat as criteria.

A summary of the specific sections follows as a guide for Greenfield to amend their land use regulations to address pollinator habitat. Each of the *Town Pollinator Plans* includes model language specific to the respective Town that can be used to update land use regulations.

Recommendations for Changes to Greenfield's Zoning Ordinance

Section 200-6.5 Parking Requirements

Section 200-6.5.D. Landscaping (add text in italics below)

Parking areas shall be screened and landscaped ... onto adjacent property. To the extent feasible landscaping should utilize native trees and shrubs that provide pollinator habitat.

Section 200-6.9 Screening and Landscaping (add text in italics below)

Section 200-6.9 B. Screening and Landscaping Design

- (1) A continuous border of dense plantings, incorporating native plants that provide pollinator habitat, at least four (4) feet wide...
- (3) Areas not covered by buildings or pavement shall be maintained in a vegetated cover, which incorporates native plants that provide pollinator habitat, or organic mulch.

Section 200-6.9 C. Screening and Landscaping Maintenance

Such screening and landscaping shall be maintained ...to provide an effective visual screen *and* to provide pollinator habitat utilizing native species.

Section 200-7.15 Large Scale Ground-Mounted Photovoltaic Installations

Section 200-7.15 C. (10)(d) Design & Performance Standards (add text in italics below)

(d) Control of Vegetation and Provision of Pollinator Habitat

The Project proponent shall install pollinator habitat comprised of native flowering plants underneath the proposed PV array and the perimeter around the array (see diagram) in accordance with UMASS Clean Energy Extension's Pollinator Friendly Solar PV Guide.

Applicant will also provide a Maintenance Plan to maintain the pollinator habitat that includes annual monitoring of the pollinator plantings and will remove invasive species and replant native flowering plants as needed. The Maintenance Plan shall incorporate Best Management Practices recommended by MA Department of Agricultural Resources and UMASS Center for Agriculture, Food and the Environment including prohibiting pesticide and herbicide use.

<u>Note:</u> Include required maintenance language in the Special Permit conditions including an annual report on the pollinator plantings based on the monitoring conducted.

Section 200-7.15 C. (10)(g) Design & Performance Standards (add text in italics below)

(g) Visual Impacts/Screening

Such plantings shall use native plants that provide pollinator habitat, and a mix of deciduous ... within the setback area.

Section 200-7.1 Open Space /Cluster Developments (add text below in italics)

Section 200-7.1.D. Procedures

- (3) Submittal requirements.
- (i) A proposed landscaping plan and grading plan. The landscaping plan shall utilize where feasible native plants and trees that provide pollinator habitat.

Section 200-8.3 Special Permits

Section 200-8.3 F. Criteria for Approval (add text below in italics)

(9) The design of the project shall... and maximize the use of screening, vegetated buffer zones, and open space *including the provision of pollinator habitat*.

Section 200-8.4. Site Plan Review and Approval

Section 200-8.4.D. Submittal Requirements (add text below in italics)

(i) Proposed landscape features including the location and a description of screening,... and plantings including native plants providing pollinator habitat.

Section 200-8.4.E. Approval Guidelines (add text below in italics)

(12) Measures to minimize impacts to farmland and forest land and to increase the provision of wildlife and/or pollinator habitat.

Recommendations for Changes to Greenfield's Subdivision Regulations

Section 880-9. Definitive plans.

- **B. Definitive Plan submission requirements.** (add text in italics below)
- (2) (v) Landscaping Plan showing the location of all existing and proposed landscaping *including* provision of pollinator habitat utilizing native plants.

Section 880-10. Streets.

A. General. Design guidelines. (add text in italics below)

(2) (g) Provide open space and pollinator habitat utilizing native plants.

Section 880-12. Protection of natural features. (add text in italics below)

Due regard shall be shown for all natural features, such as mature trees, ... locations of historical significance, *prime farmland*, *wildlife and pollinator habitat*, and similar community assets...

Section 880-14. Environmental assessment. (add text in italics below)

- A. Narrative discussion of difference among alternatives regarding:
- (8) Provision of pollinator habitat utilizing native plants, shrubs and trees.

Section 880-28. Grass plots, pollinator habitat, and trees. (add text in italics below)

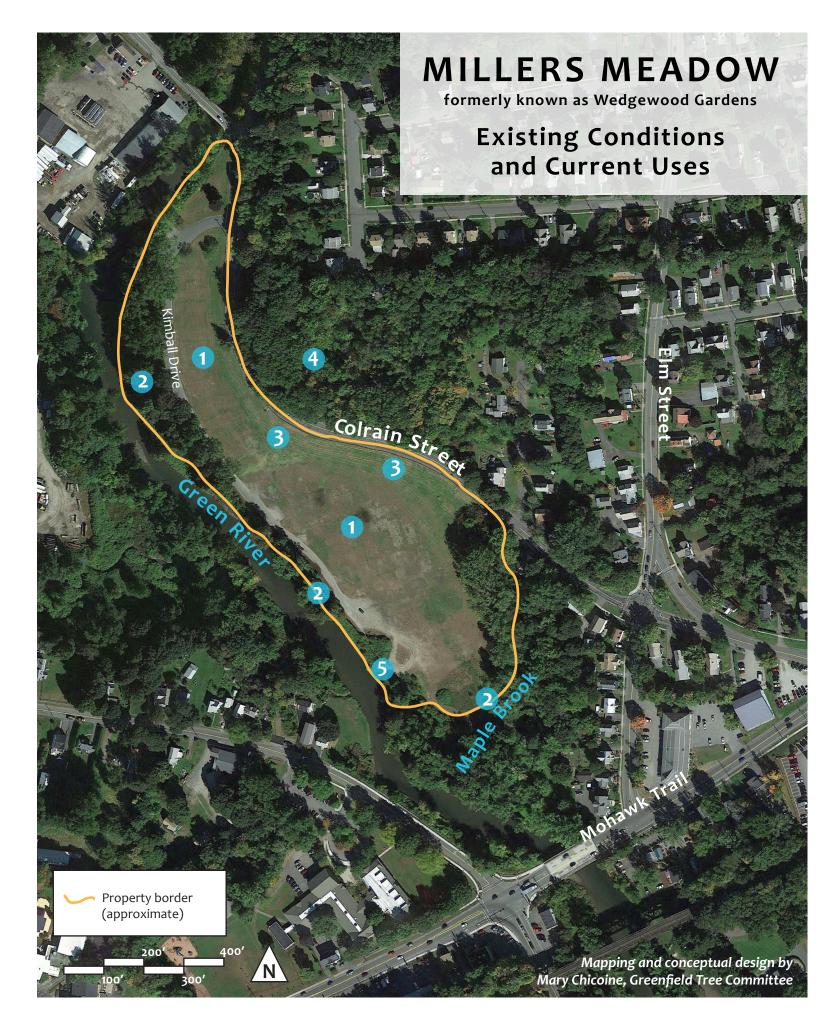
A. Tree belts of five (5) to six (6) feet wide shall be provided on each side of the roadway. When sidewalks are required, the tree belt shall be between the curb and the sidewalk with the trees planted along the center line of the tree belt. Except where LID stormwater management features are proposed (see below), the top six (6) inches of the grass plot shall consist of good quality loam extending to the right-of-way, screened, raked, and rolled with lawn grass *or pollinator habitat* seed applied in sufficient quantity to assure adequate coverage, rolled when the loam is moist.

Millers Meadow (also known as Wedgewood Gardens) Concept Design

During the Greenfield Pollinator Planning workshops, participants considered several different sites across the city where a concept design for pollinator habitat would be developed. Key factors including limitations or disadvantages of each site, options for long-term care and maintenance of by an entity other than the Greenfield DPW, educational and stewardship opportunities for the community were identified in an online survey that FRCOG created using Survey Monkey. Survey respondents ranked their choices and provided useful input on the potential and/or drawbacks of each site. Millers Meadow was the site that received the most votes from Greenfield's pollinator stakeholders.

The concept design included in this plan was developed by a sub-group of stakeholders, which included members of the Greenfield Tree Committee and Greening Greenfield, with support from Greenfield's Department of Planning and Development Director and Conservation Commission Vice-Chair. It is preliminary and expresses a vision for the Millers Meadow site to be revitalized with native plants and removal of invasives. The overarching goal for the property is to create a community park with universal access, while returning the land to a more wild state, remediating environmental degradation and replanting for a riverfront, riparian habitat that will be resilient to occasional flooding.

FRCOG developed a pollinator plant list that is part of the *Regional Pollinator Habitat Corridor Implementation Toolkit* for communities to use in the planting design when the time comes to further develop the concept design and work towards implementation.



A sub-group of the stakeholders involved in the Greenfield Pollinator Plan met to assess the potential of Millers Meadow - formerly Wedgewood Gardens - to support pollinator habitats. The sub-group included members of Greenfield Tree Committee and Greening Greenfield, with support from Greenfield's Department of Planning and Development Director and Conservation Commission Vice-Chair. The group documented obvious existing conditions and known current uses, discussed the best uses of the site and potential for pollinator habitat, and developed a high-level conceptual design.

EXISTING CONDITIONS

The flat part of the site is highly disturbed, having been the location for a trailer park. After being subjected to a flood in 2005, the trailer park and foundations were removed (2008). Utilities were disconnected but infrastructure is still buried on the site. The flat area is likely highly compacted and could contain cement, gravel and other materials.

The riparian area between the access road (Kimball Drive) and the Green River, as well as along Maple Brook, is highly impacted by invasive plant species, with Japanese knotweed growing in thick colonies along the river. Native trees and plants observed in this area include sycamore, silver maple, oak, and bloodroot, all of which should be planted as invasive plant species are removed.

The site includes a steeply sloped area that runs along Colrain Road. The Colrain Road sidewalk will be redone this year as part of a Complete Streets project.

Trees observed on the steeply sloped hill adjacent the site - which would likely also grow well on the sloped part of Millers Meadow - include: Oak, hickory, cherry, sugar maple, musclewood, and birch. Shrubs and herbaceous plants on the same area include trout lily, rue, wild geranium, early meadow rue and Solomon's seal. Note: There are also invasive plant species along the road at the base of this hilly area

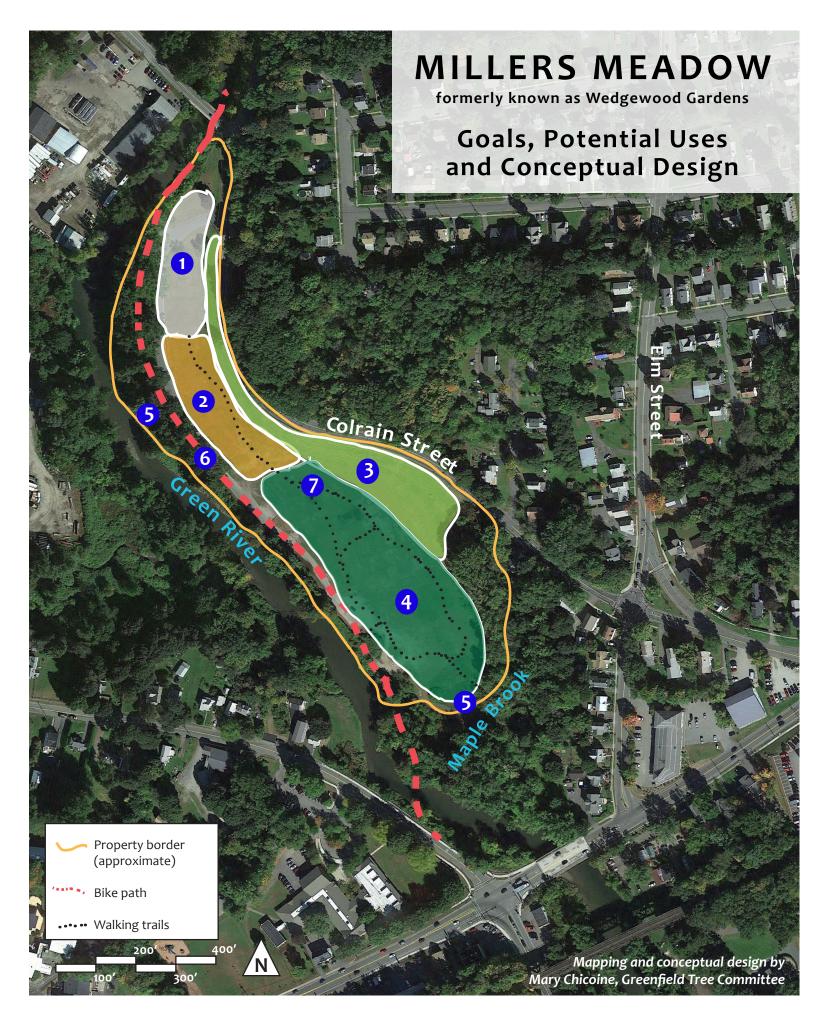
The Green River's bank has been determined to be too steep to accommodate an affordable boat launch/ramp. Some riverbank slumping has occurred and DPW has added riprap and planted grass to try to prevent further erosion.

Other Information:

- This nearly 15-acres site is under the management of the Greenfield Conservation Commission.
- The site is a Priority Habitat for Rare Species under MassWildlife's Natural Heritage & Endangered Species Program.
- Most of the site is located in the floodplain and within the Green River Management corridor. With
 increased intensity of storms due to climate change, this site serves an important ecological function of storing flood water during high river water conditions.
- FEMA deed restrictions no structures or fencing allowed; agricultural use okay. Adding trees is likely okay, but this needs to be confirmed.

CURRENT USES

- The site is used as an informal dog walking area.
- Occasional event parking for Green River Festival and Wormtown is permitted on the grassy, flat area by the Conservation Commission on a case-by-case basis.
- Sections of the sloped area along Colrain Street is used for sledding.
- People use the site as a hang-out place with frequent automobile use on and off paved access road
- The site is occasionally used for fishing and kayak access.



GOALS AND POTENTIAL USES

The overarching goal for this property is to create a community park with universal access, while returning the land to a more wild state, remediating environmental degradation and replanting for a riverfront, riparian habitat that will be resilient to occasional flooding. Going hand-in-hand with this goal are the following objectives:

- 1. Providing habitat for pollinators and wildlife, including a pollinator demonstration area
- 2. Providing walking trails and places to birdwatch and view nature
- 3. Providing visitor parking, a nature-based playground and a field for informal recreation
- 4. Removing invasive plant species and planting native tree and plant species throughout the site
- 5. Creating a bike path that connects to existing bike paths and routes
- 6. Providing a river viewing platform

Achieving the goal of creating such a beautiful, functional community park will require support of the Conservation Commission and well as support from community members. It will also require securing grants to fund site assessments, any needed remediation and restoration, planning, outreach, design and installation. Engaging project partners such as the Greenfield Community Preservation Committee, Greenfield Tree Committee, Greening Greenfield and Connecticut River Conservancy would also be vital to this vision becoming a reality.

CONCEPTUAL DESIGN AND PHASED APPROACH

Given the breadth of the project, a phased approach would be prudent, starting with a site assessment and overall site design, as well as an invasive plant species eradication plan. Site design could be developed based upon the intensity of use in different sections of the park as follows:

- 1 With much of the access road pavement removed and large event parking relocated to different city-owned land, a pervious or gravel parking area is located close to the entry off Colrain Street.
- An approximately 1 1/2 acre grassy area includes space for light recreation, a nature-based play-ground, picnic tables and composting toilet. A pollinator demostration area would be included in this area, with interpretive signs describing the role of the entire park and its native vegetation in supporting pollinators. All facilities would be designed to accommodate periodic flooding from the river.
- This area along the hillside is replanted, with native trees and plants, including the types of trees and other plants that are growing well on the hill across Colrain Street. Trees and plants that support pollinators are emphasized. Gaps are left in the planted areas to accommodate sledding.
- The flat area is returned to floodplain forest, with native trees, shrubs and other plants thriving, including sycamore, silver maple and other plant species that support pollinators and other wildlife.
- The riverbanks and wooded areas along the Green River and Maple Brook are restored to a healthy ecosystem, with invasive plant species removed and replaced with native plant species. Access to the water through these areas is discouraged, except via marked trails.
- 6 A bike path connects to the existing bike path across Colrain Street and eventually includes a bridge to reach east along the river.
- Walking trails meander through the woods, and benches, dog clean-up stations and other amentities are located along the trails. A river viewing platform can be accessed via walking trails as can views of Maple Brook.

MAPS

MAPS OF EXISTING & POTENTIAL POLLINATOR HABITAT SITES

North Greenfield

South Greenfield

City Center

Pollinator Corridors & Stepping Stones

DPW Roadside Mowing

LANDSCAPE ANALYSIS MAPS

Habitat and Environmental Resources

Land Cover and Land Use

Permanently Protected & Municipal Properties

North Greenfield

Existing & Potential Pollinator Sites

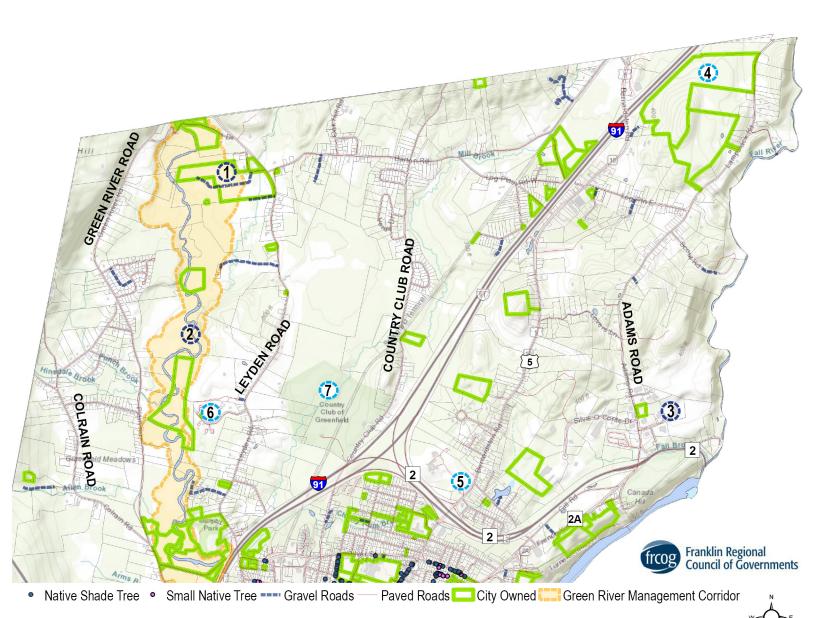


EXISITING POLLINATOR SITE WITH 500' RADIUS



POLLINATOR SITE OPPORTUNITY WITH 500' RADIUS

- Native Shade Trees + Small Native Trees pollinator streetscapes
- 1. Just Roots Farm
- 2. The Green River
- 3. BETE Fog Nozzle, Inc.
- 3. Griswold/GTD Conservation Area
- 4. Stoneleigh Burnham School
- 5. Leyden Woods
- 6. Country Club of Greenfield



South Greenfield

Existing & Potential Pollinator Sites



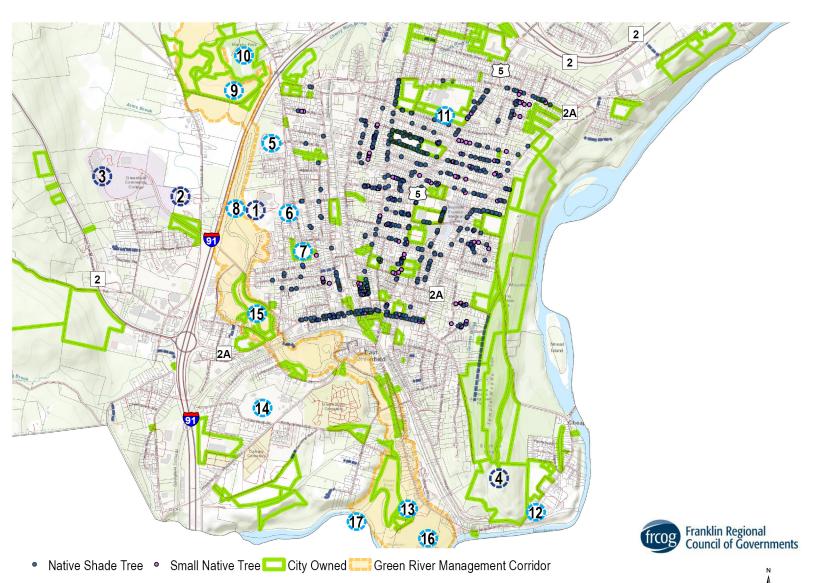
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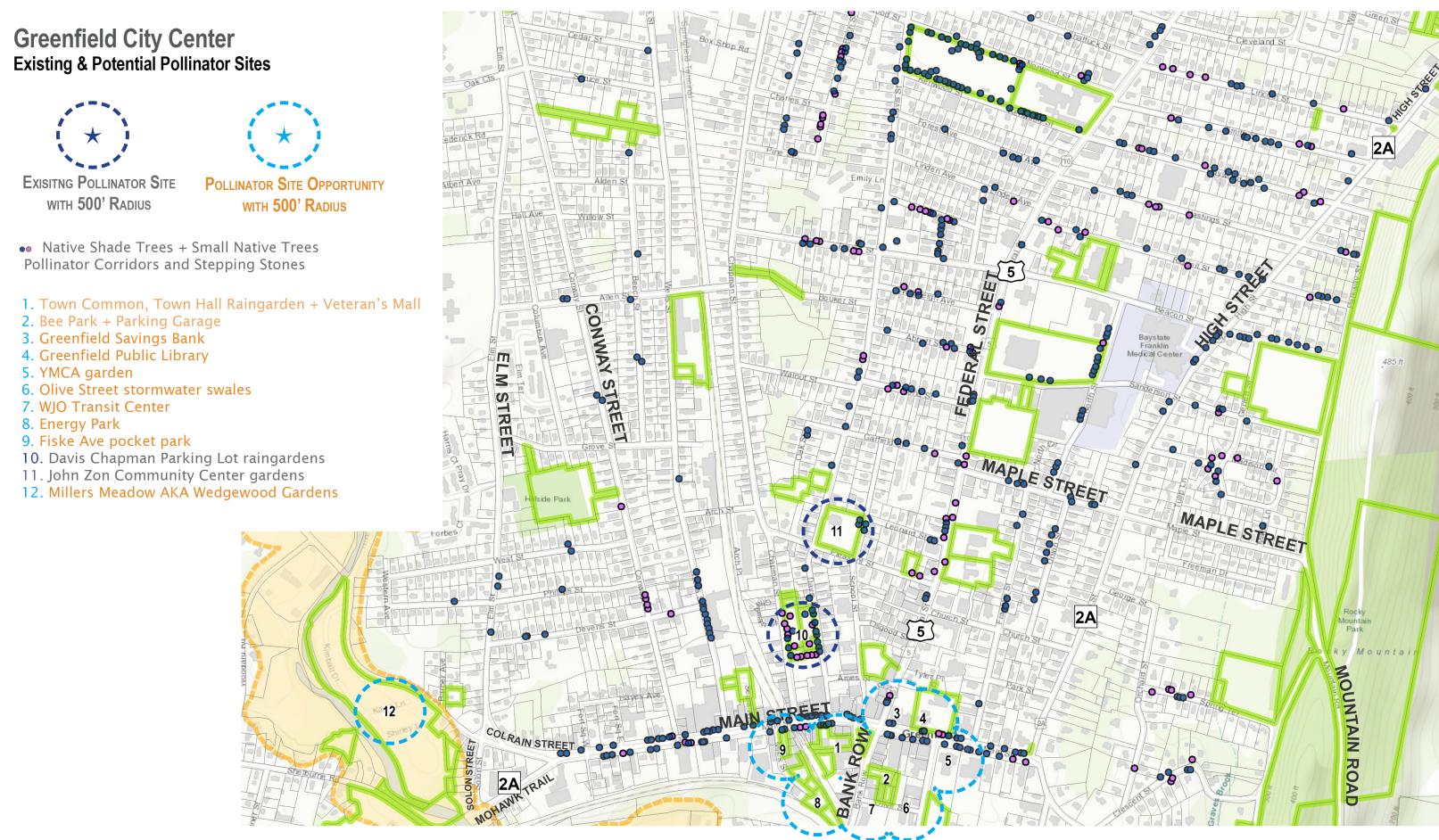


POLLINATOR SITE OPPORTUNITY WITH 500' RADIUS

- Native Shade Trees + Small Native Trees pollinator streetscapes
- 1. Franklin County Jail Permaculture Garden
- 2. Four Rivers School
- 3. Greenfield Community College Outdoor Learning Labratory
- 4. Temple Woods + Rocky Mountain Park
- 5. Oak Court Apartments
- 6. Elm Court Apartments
- 7. Greenfield Garden Apartments
- 8. Green River Bike Path
- 9. Green River Recreation Area
- 10. Murphy Park
- 11. Shattuck Park

- 12. The Center School
- 13. Waste Water Treatment Plant
- 14. Franklin County Fairgrounds
- 15. Millers Meadow AKA Wedgewood Gardens
- 16. Meadows Golf Course
- 17. Green River confluence with the Deerfield River

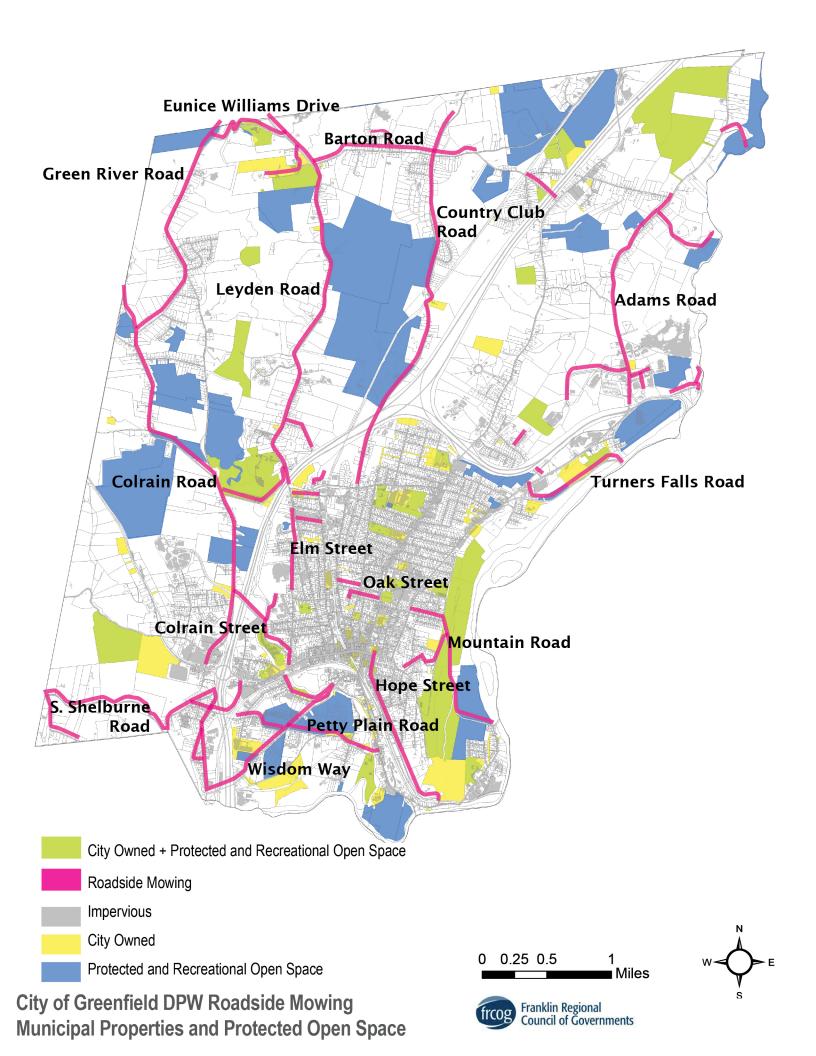


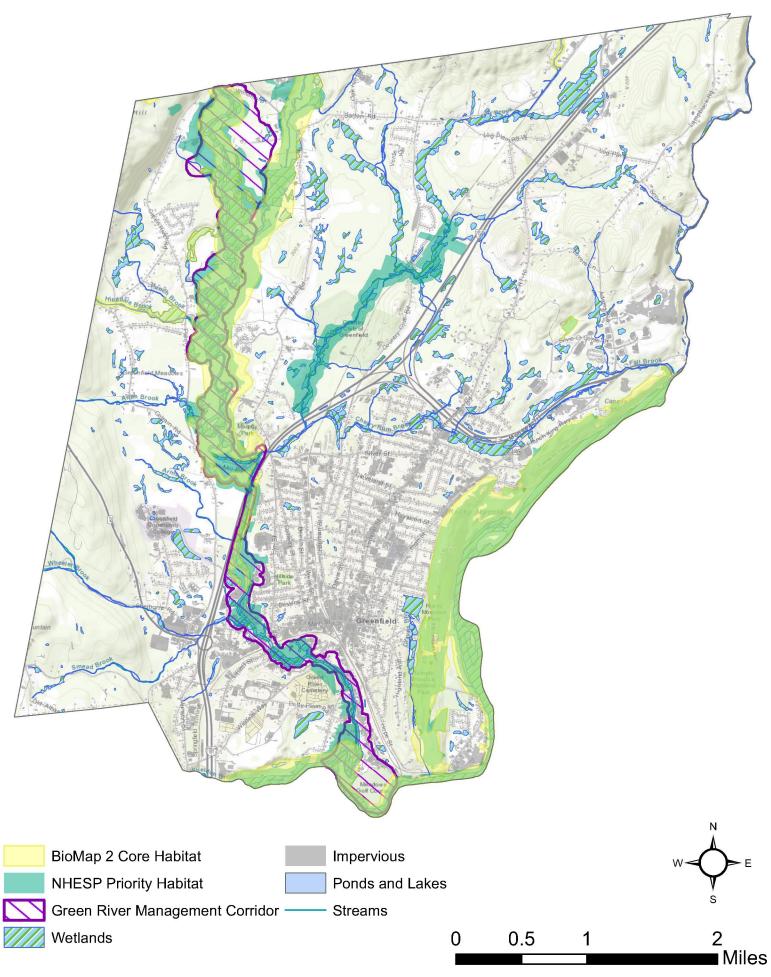


Native Shade Tree
 Small Native Tree
 City Owned
 Green River Management Corridor

Franklin Regional Council of Governments w 🍑

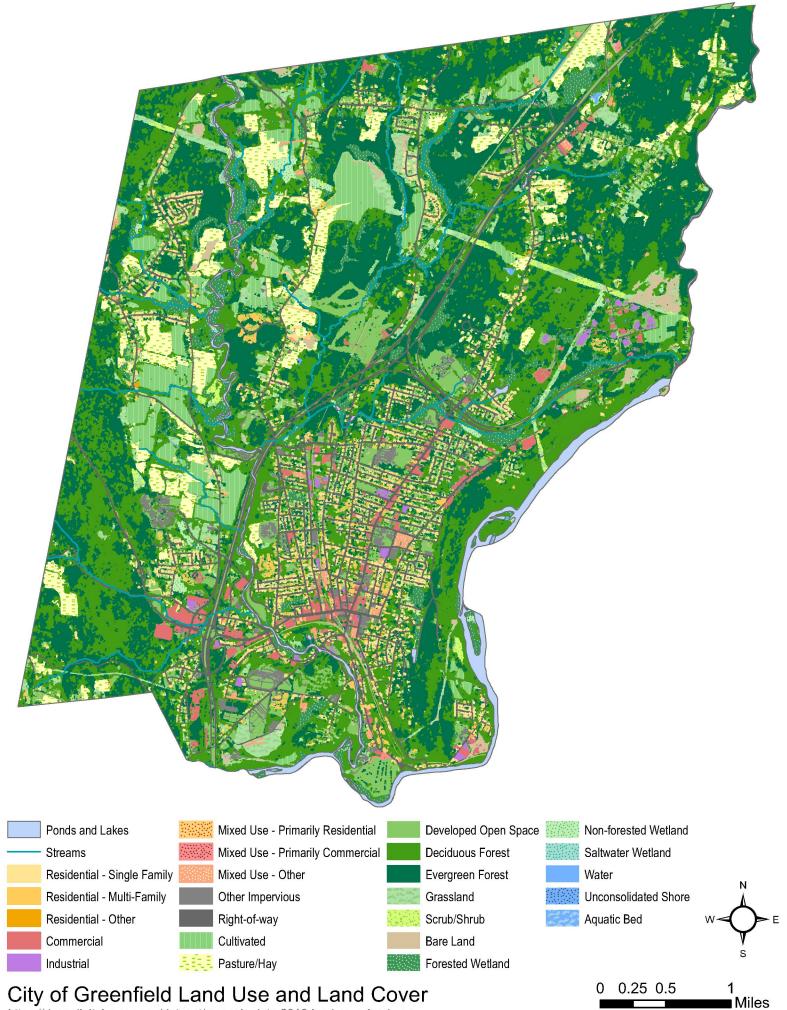


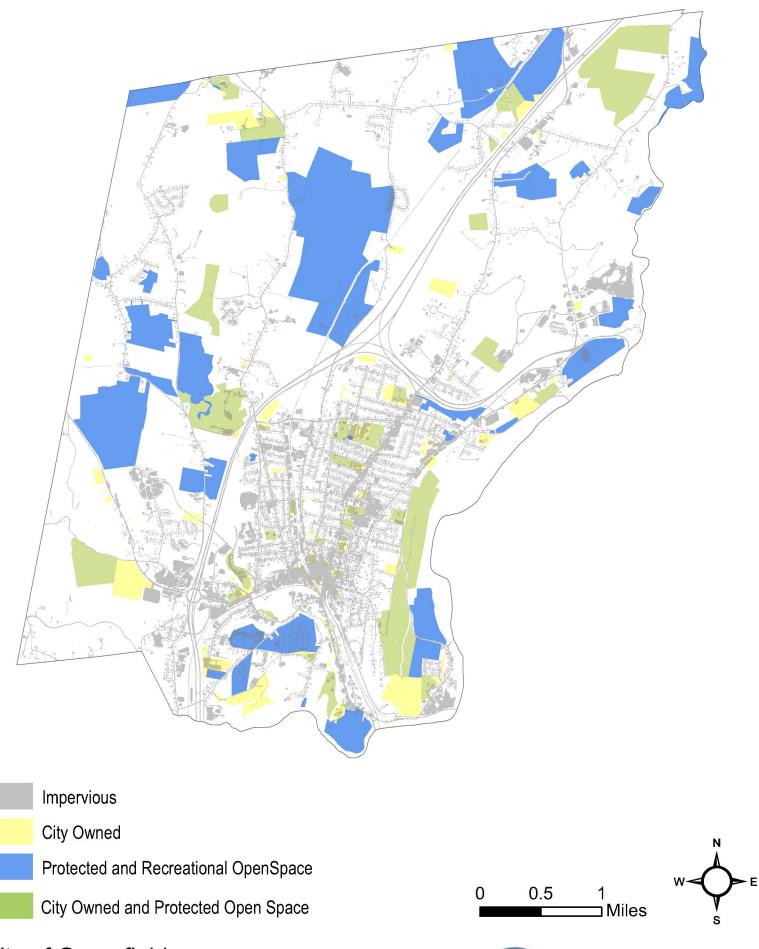




City of Greenfield Habitat and Environmental Resources

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community





City of Greenfield Open Space and Municipal Properties

